

**SCHEMATIC
DIAGRAM**

CRUMAR[®]
Musical Instruments

**mod.
T3**



FEMALE CONNECTOR SYMBOL (es. J 2/1)



PLUG IN CONNECTOR SYMBOL



WIRE SOLDERING POINT



TEST POINT (T P...)



CONNECTING POINT (ON p.c.b.)



METALLIC FILM RESISTOR 1%

ALL resistors 1/4w unless otherwise indicated

ALL tab switches shown in OFF position

ALL key switches shown in OFF position

See part list for component part numbers

CRUMAR RESERVES THE RIGHT TO CHANGE
SPECIFICATIONS AND DESIGNS, WITHOUT
NOTICE AND LIABILITY.

**SCHEMATIC
DIAGRAM**

mod.
T 3

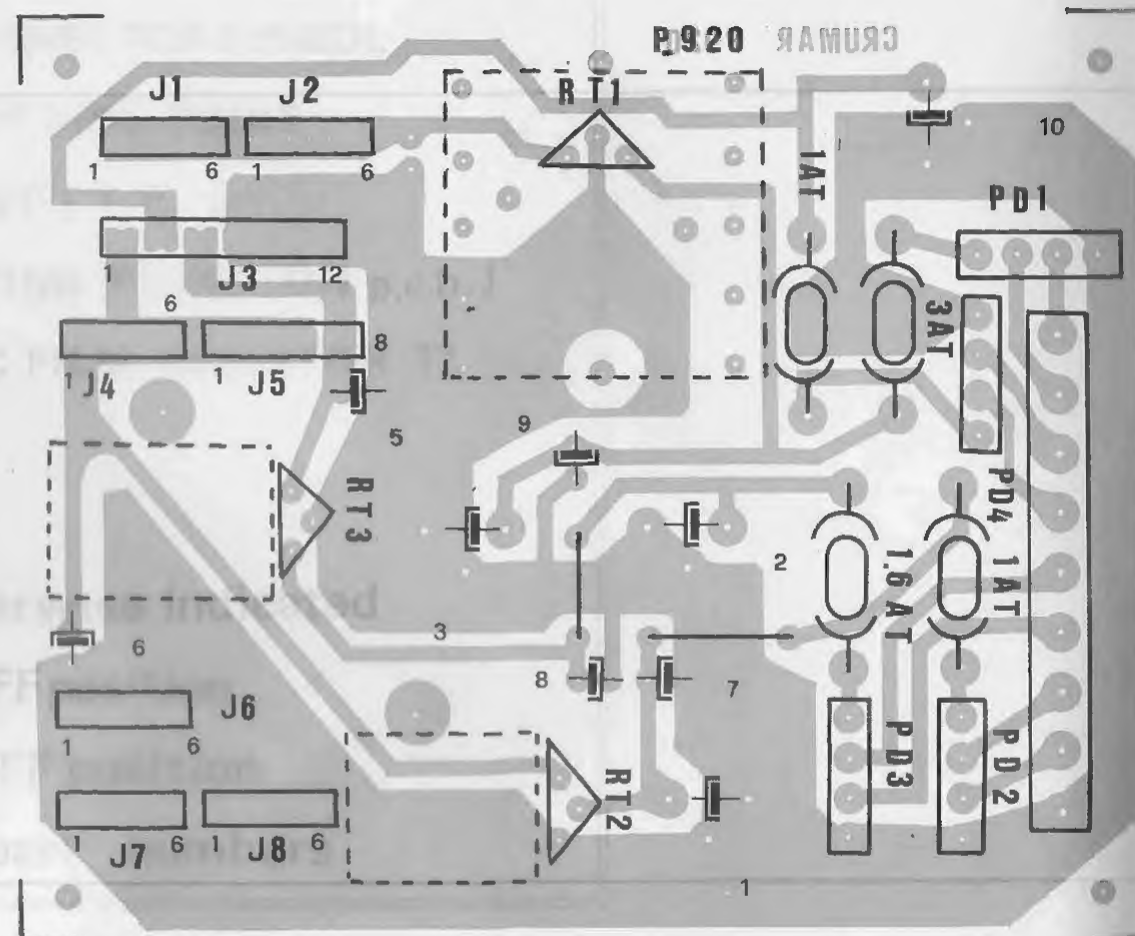
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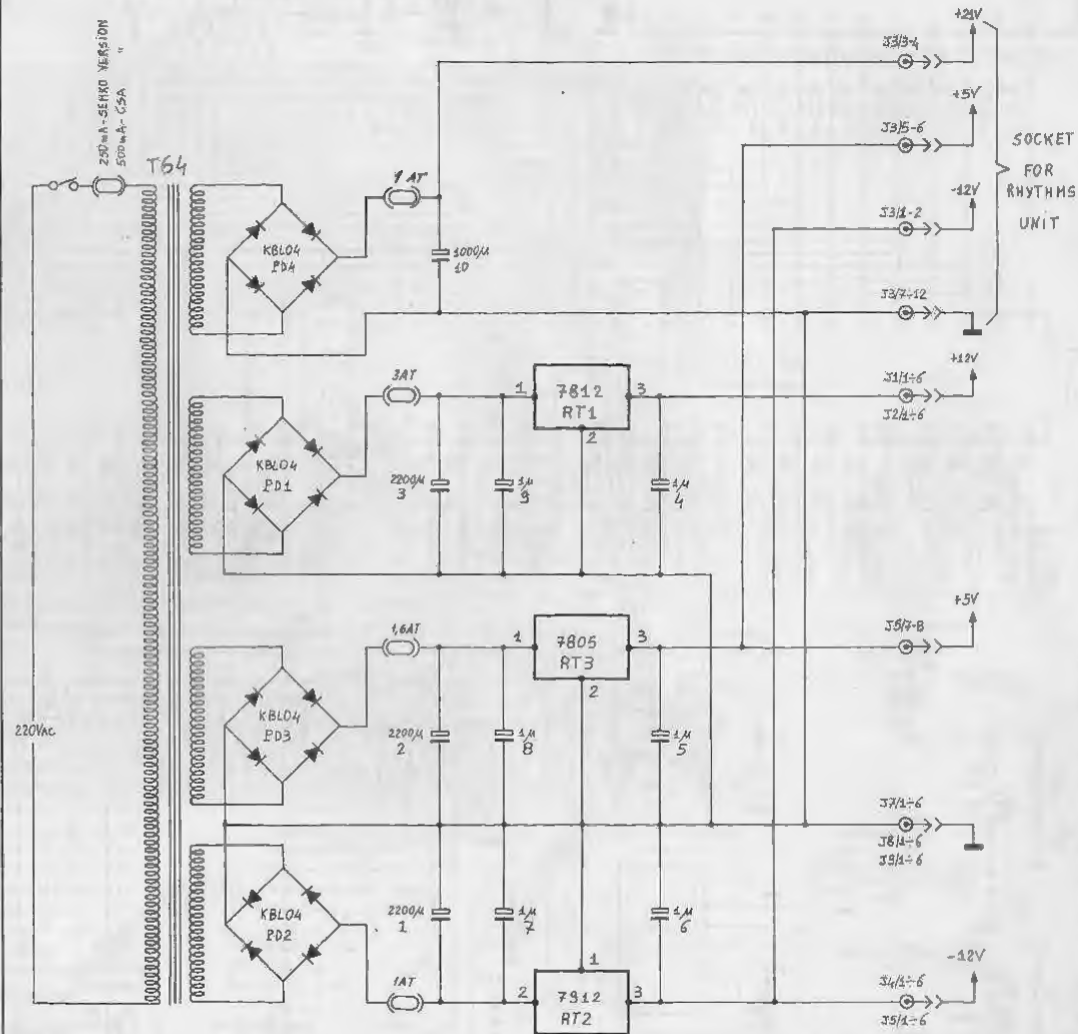
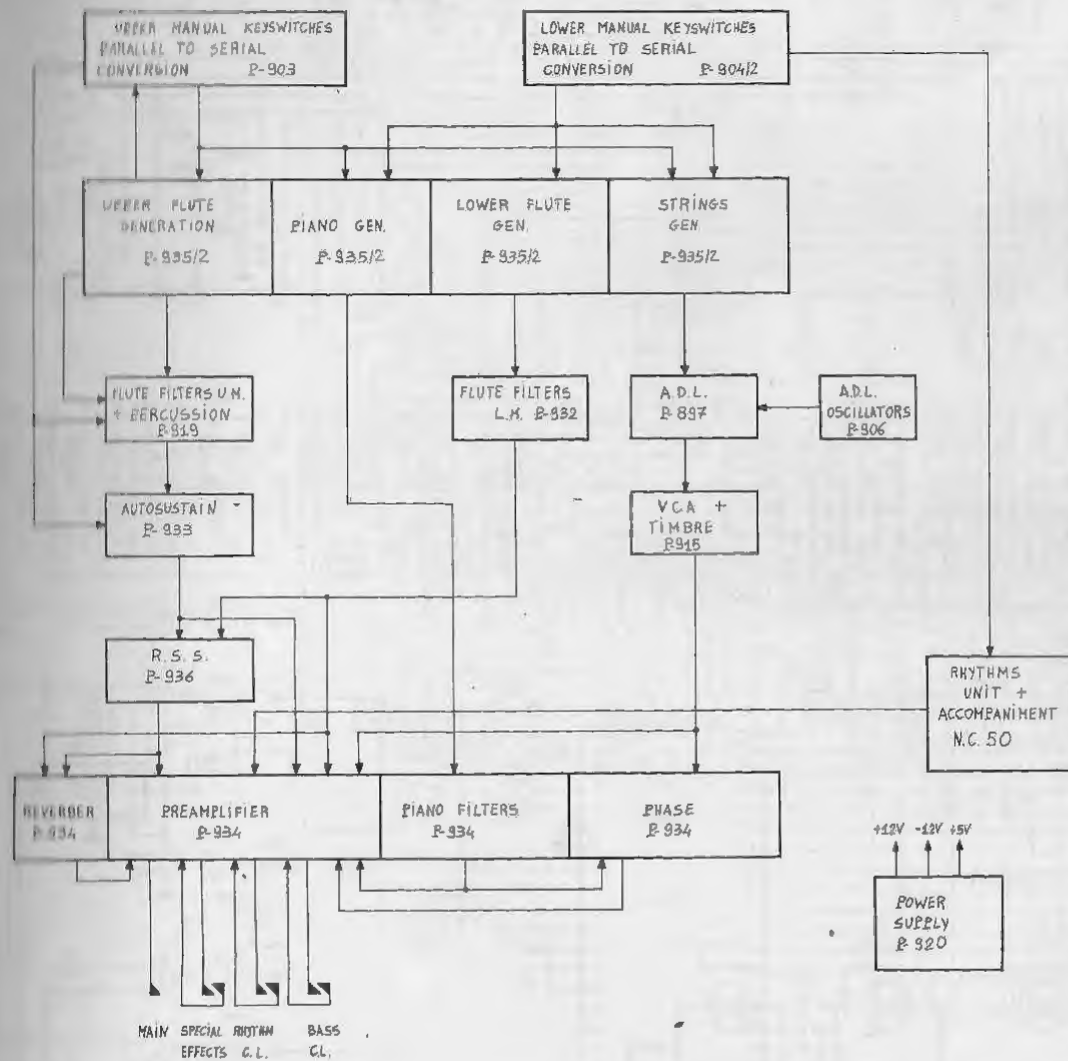
= POWER SUPPLY
= FLUTES - PIANO - STRINGS
GENERATION
= PIANOS SWITCHES
= POTENTIOMETER BOARD
= UPPER MANUAL KEYSWITCHES
= LOWER MANUAL KEYSWITCHES
= FLUTE FILTERS UPPER MANUAL
= AUTO SUSTAIN - PRESETS SWITCHES
= PERCUSSION SWITCHES
= FLUTE FILTERS LOWER MANUAL
= FLUTE L.M. - CANCEL UP - LOW
SWITCHES
= VOLUME CONTROLS
= AUTO SUSTAIN
= R.S.S.
= R.S.S. SWITCHES
= AUTO SUSTAIN - PRESETS SWITCHES
= A.D.L. OSCILLATORS
= DELAY LINES
= STRINGS SWITCHES
= VOLUME CONTROLS
= STRINGS CONTROLS
= BASS SWITCHES
= POTENTIOMETER BOARD
= PEDALBOARD
= PEDALBOARD KEYSWITCHES
= FINAL PREAMPLIFIERS
= PHASE SWITCHES
= PIANOS SWITCHES
= VOLUME CONTROLS
= POTENTIOMETER BOARD



QUESTO DISEGNO È PROPRIETÀ PRIVATA E NON PUÒ ESSERE
MOSTRATO A TERZO SENZA NOSTRA APPROVAZIONE SCRITTA

CRUMAR		MODEL: T3
DRAWN BY	Bonanni G.	REVISION
DESIGNED BY	Flu	DATE

BLOCK DIAGRAM



POWER SUPPLY P-920

REPRODUCED FROM THE ORIGINAL DRAWING BY THE U.S. GOVERNMENT PRINTING OFFICE: 1967 O 345-741

CRU-AR 0001-1-3

REVISION 1

DATE 1/1/67

BY J. J. J. 1/1/67

50240 IC1

SM305 IC7
LOWER MANUAL

SM305 IC6
UPPER MANUAL

SM305 IC5
UPPER MANUAL

50240 IC15

SM302
IC3

SM302
IC4

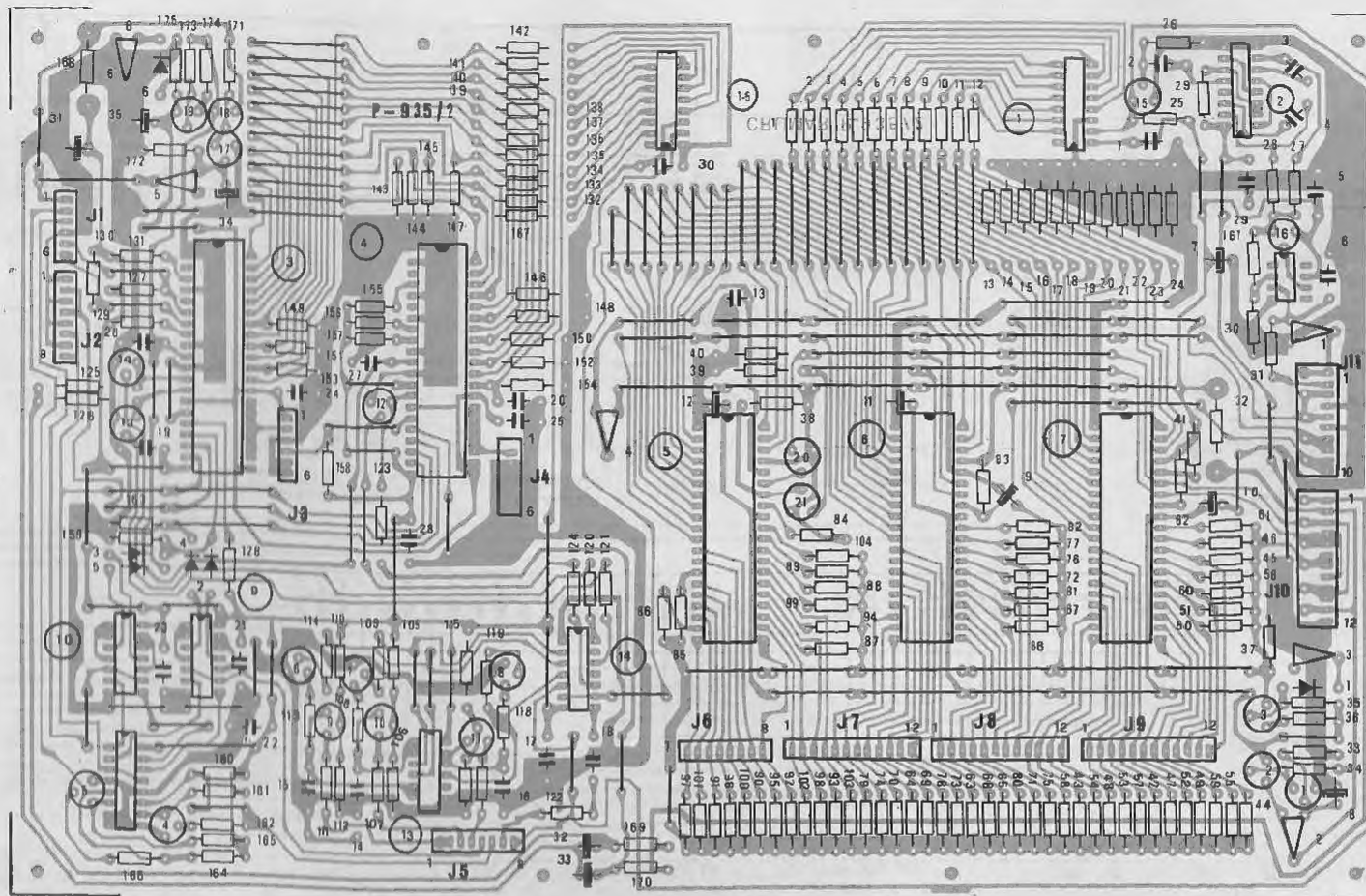
IC13-4005

P-935/2

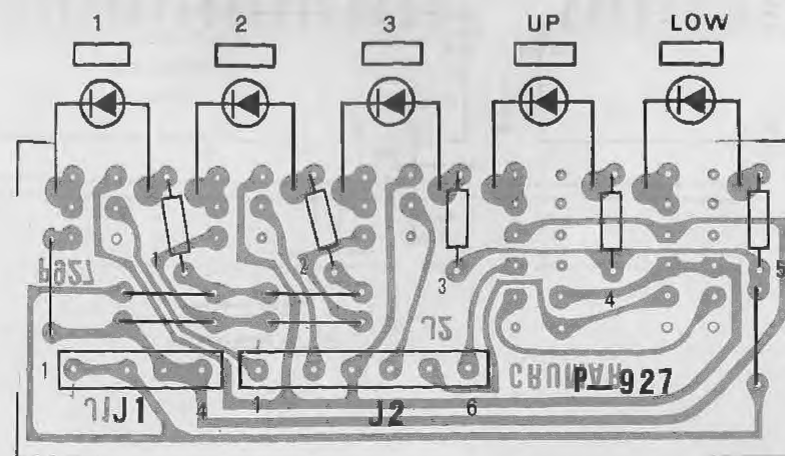
IC8-10-4011

QUESTO CIRCUITO È PROPIETÀ PRIVATA E NON PUÒ ESSERE RIPRODOTTO
MODIFICATO O TERZO SENZA NOSTRA APPROVAZIONE SCRITTA

CRUMAR		MODEL T3	
DRAWN BY	Bordaux G.	REVISION	
DESIGNED BY		DATE	25/6/81

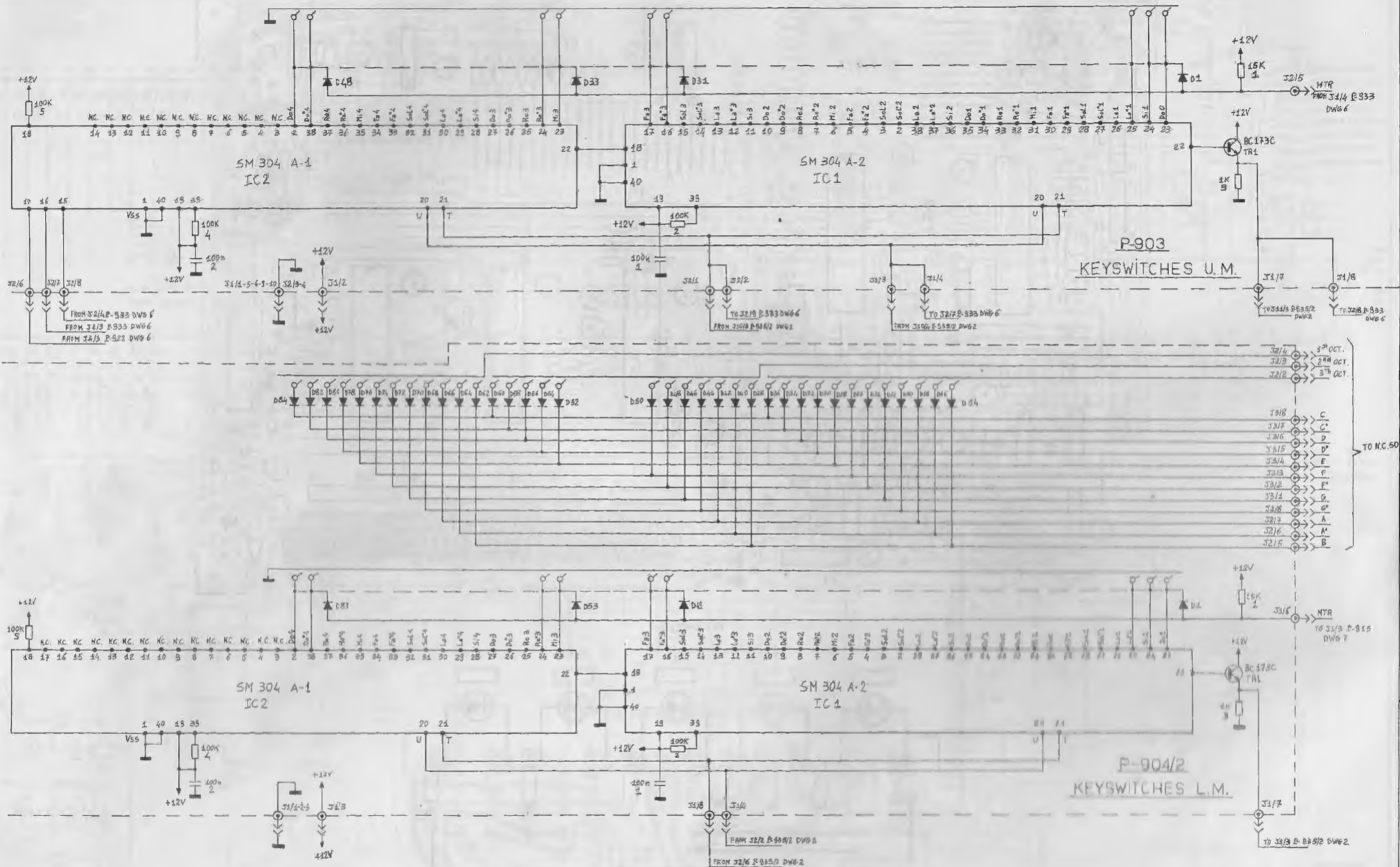


PIANOS



QUESTO INDIRIZZO È PROTETTO DA UNA SOSTANZA CHIMICA E NON PUÒ ESSERE VISIBILE PER GLI UOMINI. IL DOCUMENTO È STATO CREATO DA UN SISTEMA AUTOMATICO E NON È POSSIBILE LA MODIFICA MANUALE. IL DOCUMENTO È STATO CREATO DA UN SISTEMA AUTOMATICO E NON È POSSIBILE LA MODIFICA MANUALE.

CIRCUIT		MODEL	
DESIGNED BY	DESIGNED BY	DATE	DATE
DESIGNED BY	DESIGNED BY	DATE	DATE



QUESTO DISSEGNO È PROPRIETÀ PRIVATA E NON PUÒ ESSERE RIPRODOTTO, MODIFICATO O USATO IN ALTRA MANIERA SENZA LA NOSTRA AUTORIZZAZIONE SCRITTA.

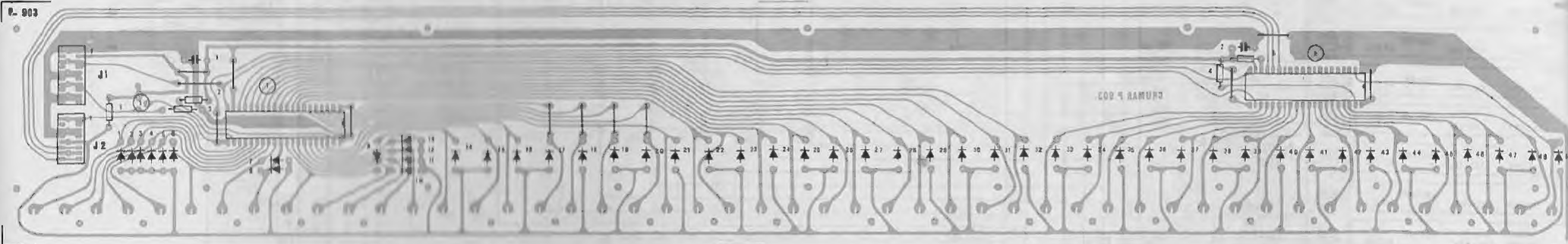
CRUMAR MODEL: T3

DESIGNED BY: B. G. G. DESIGNED BY: B. G. G.

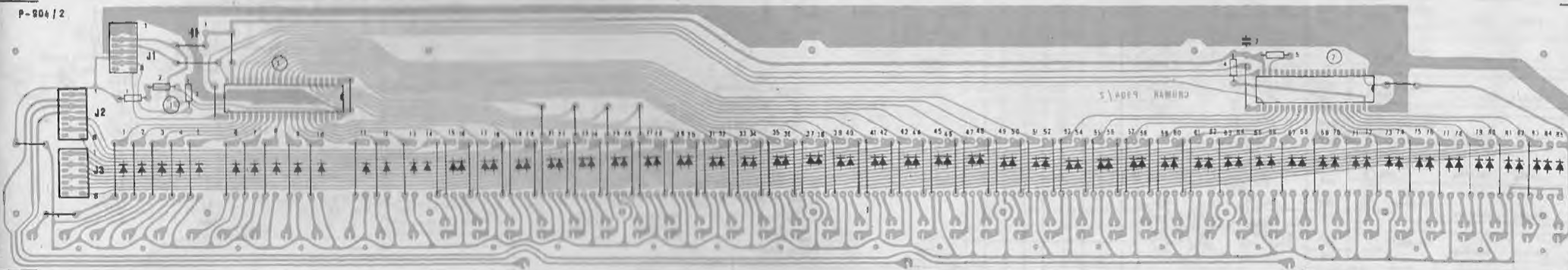
DATE: 19/6/81

DWG 3

P-903



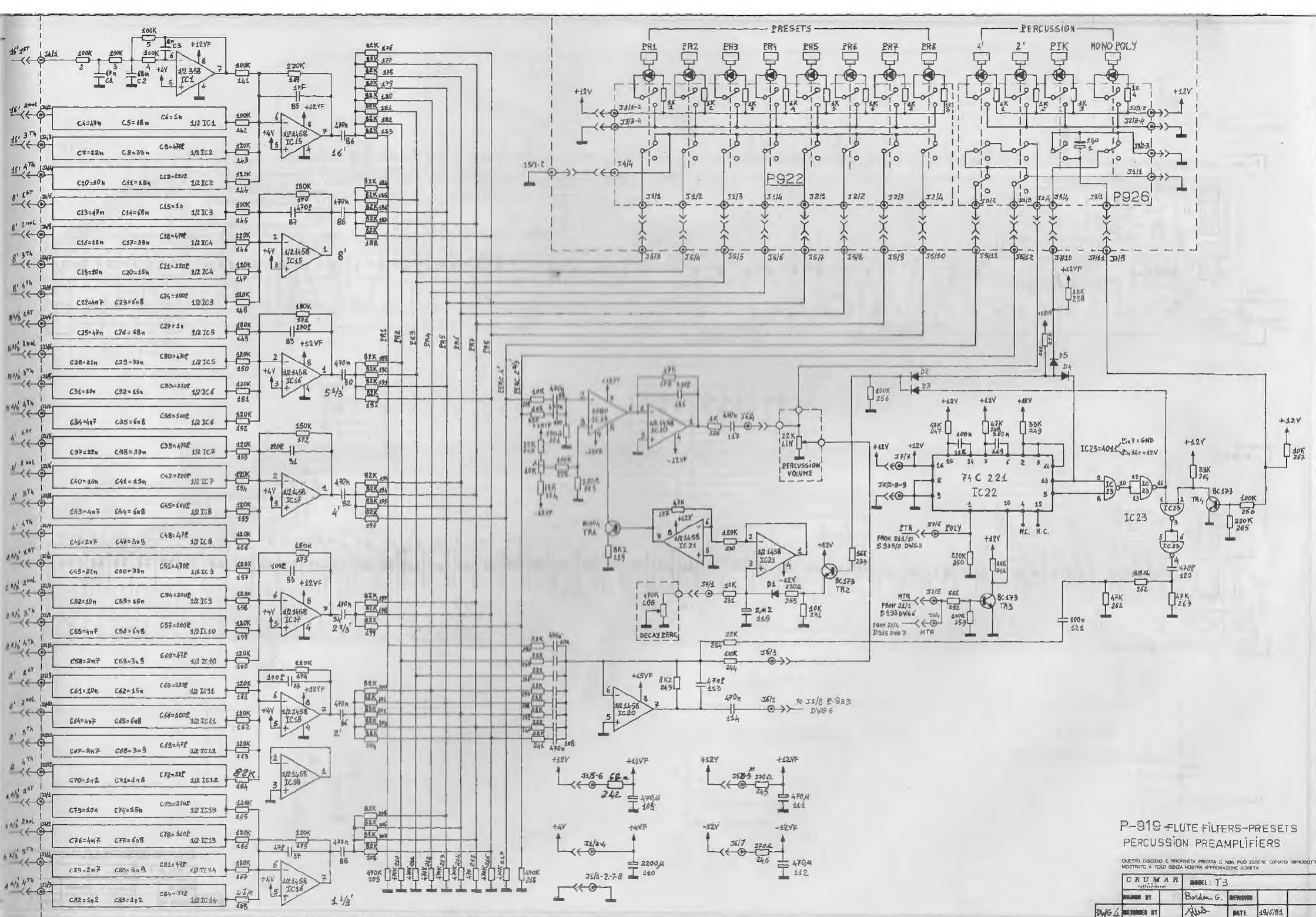
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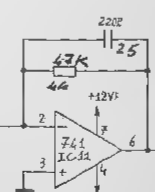
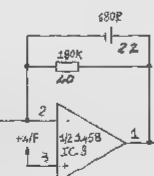
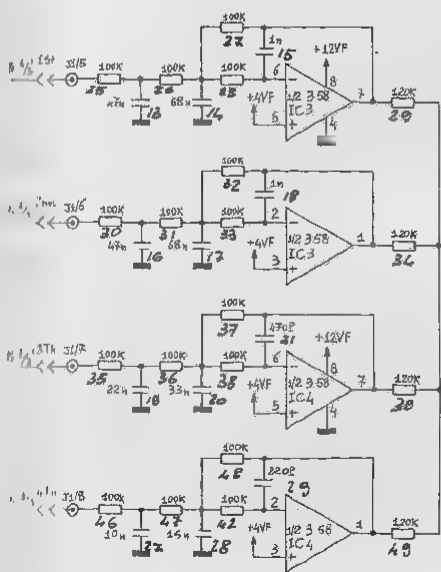
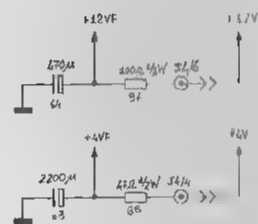
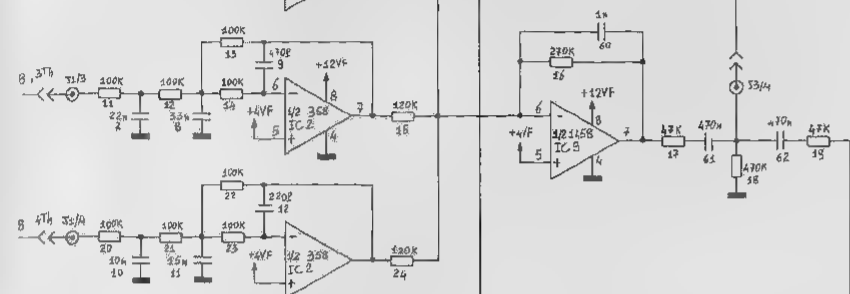
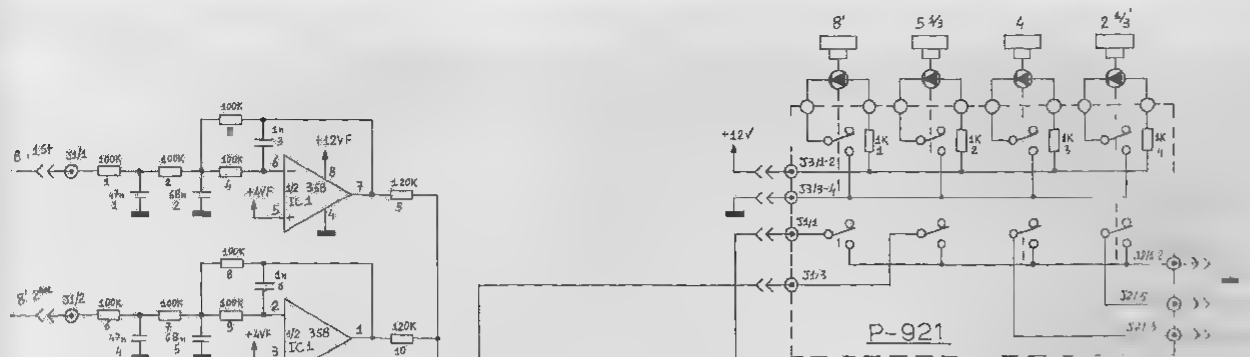


QUESTO DISEGNO È PROPRIETÀ PRIVATA E NON PUÒ ESSERE COPIATO, RIPRODOTTO, MISTO O A TUTTO BANDO, SENZA APPROVAZIONE SCRITTA.

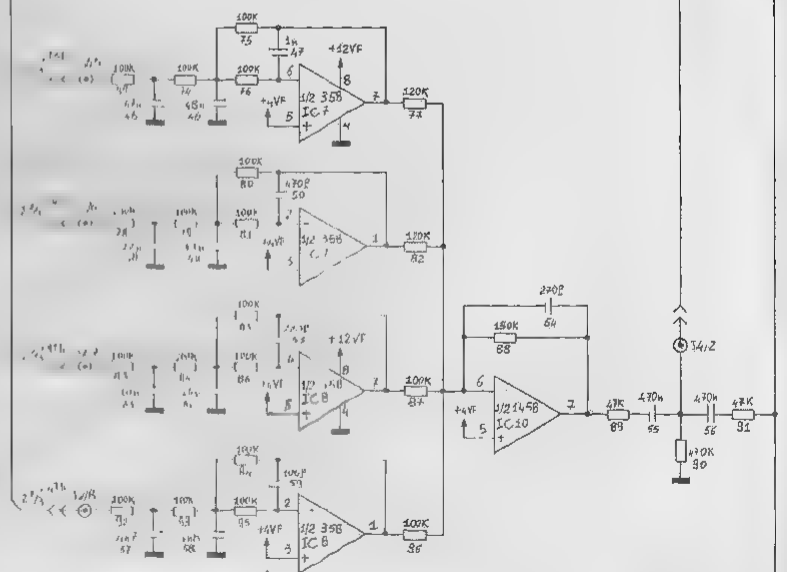
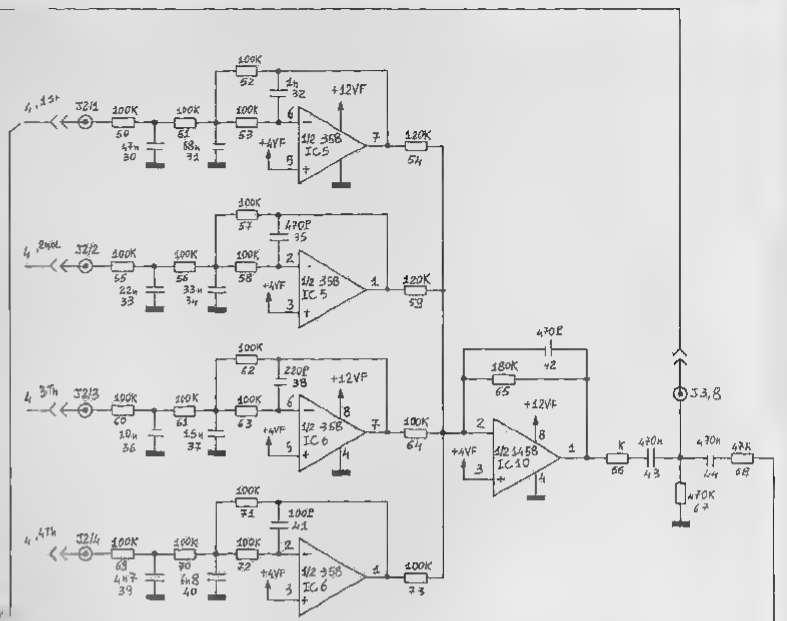
CRUMAR		MODEL: T3
DRAWN BY	Bondini G.	DESIGNED
CHECKED BY		DATE

DMG-3A





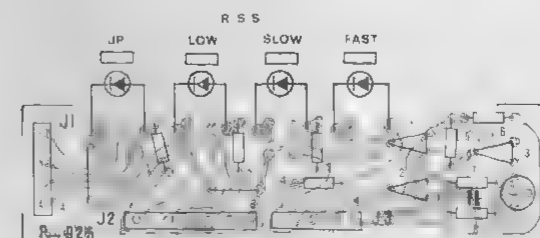
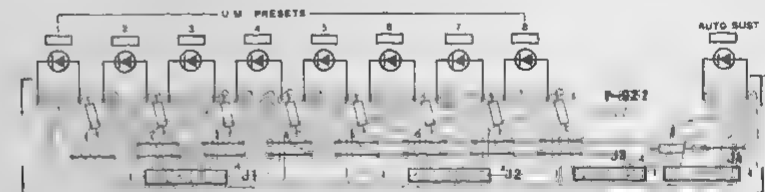
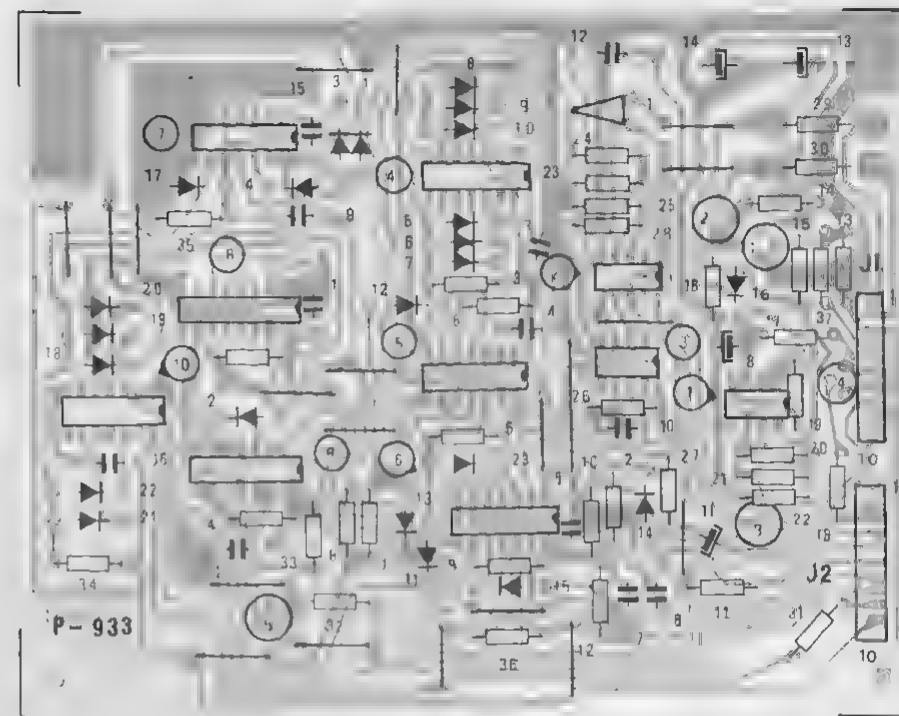
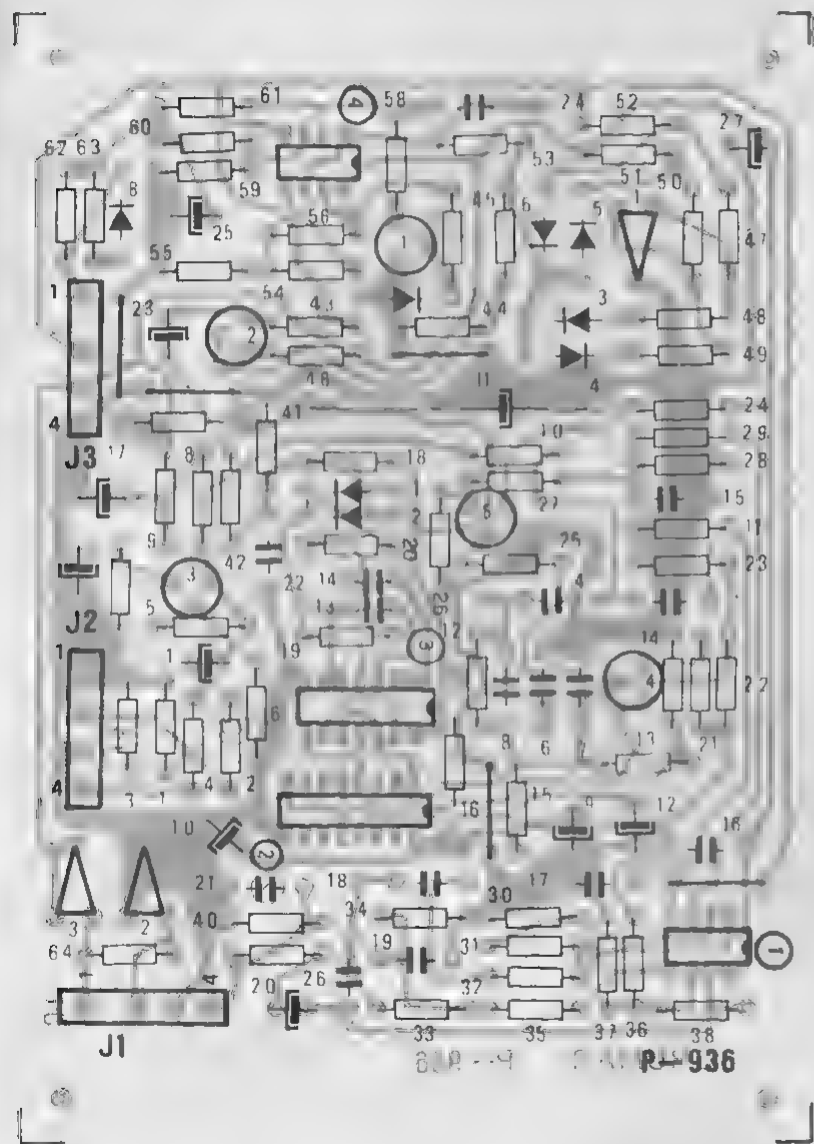
P-932

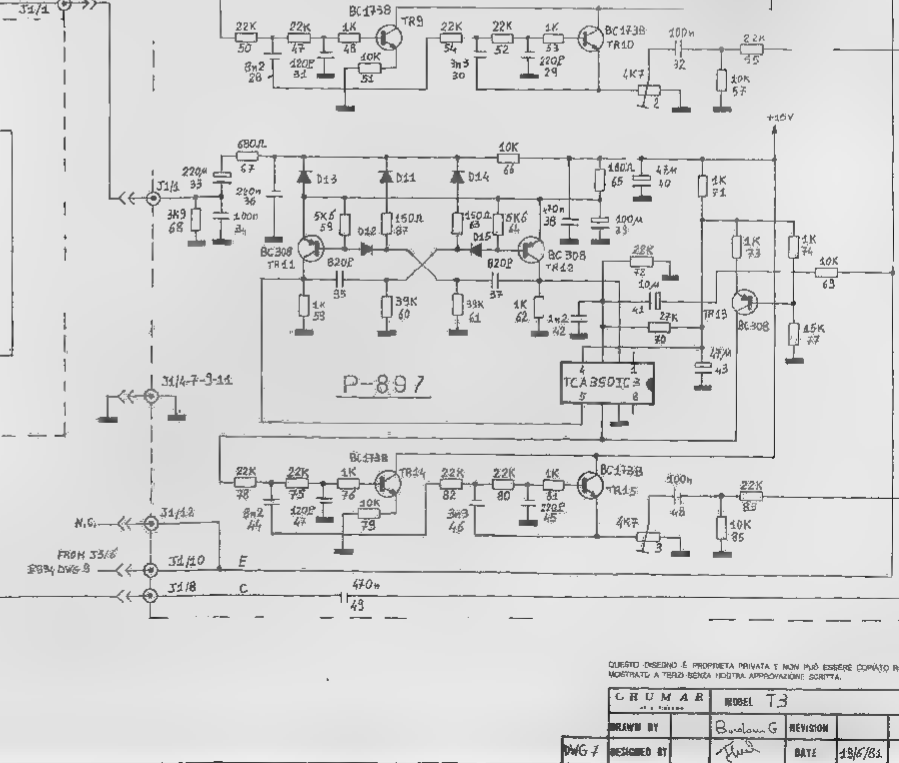
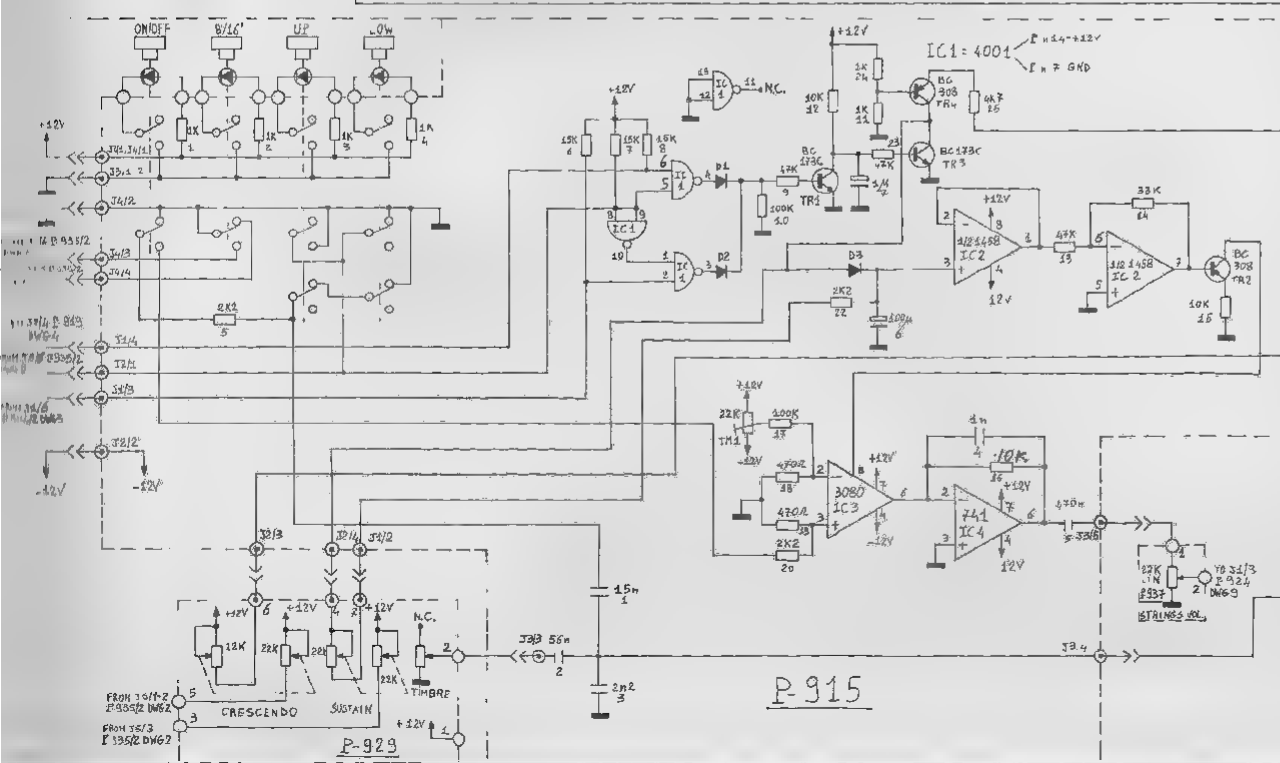
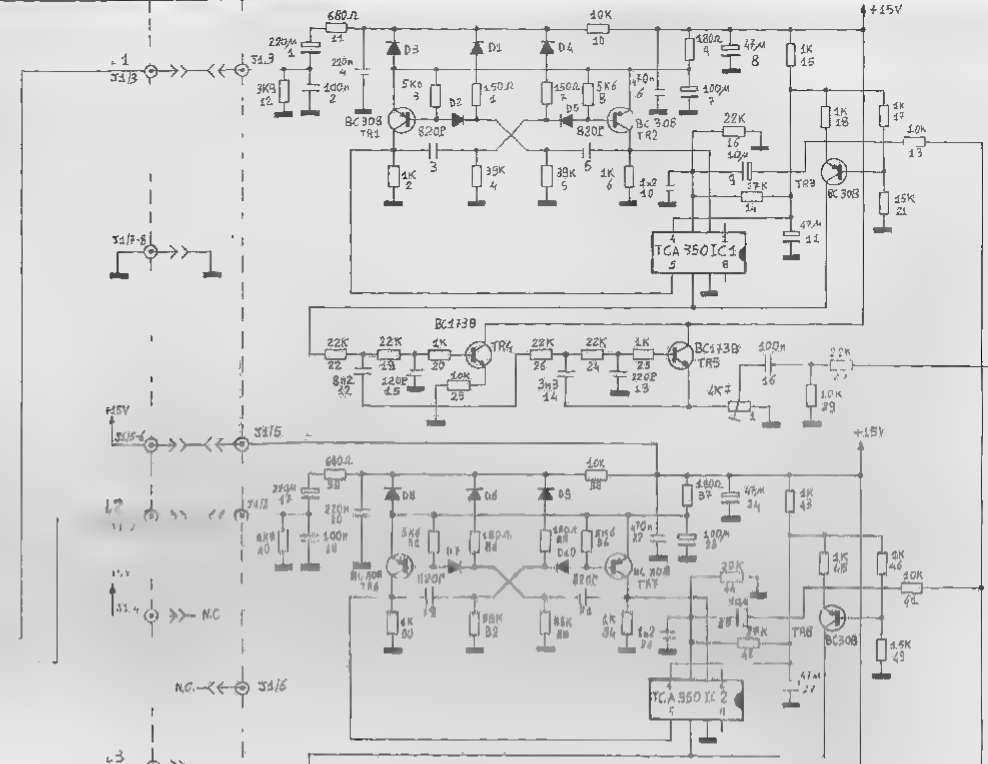
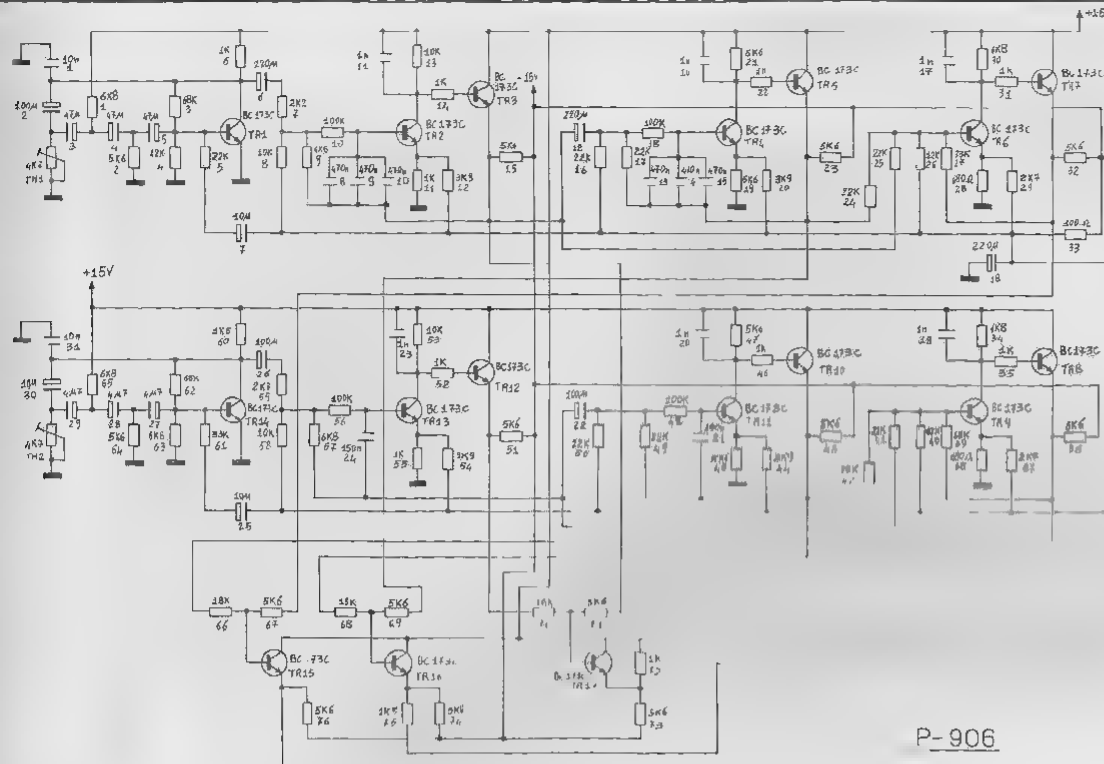


QUESTO DISPOSITIVO È PROPRIO DI UN'UNITÀ E NON PUÒ ESSERE COPIATO REPRODOTTI
MOSTRATO A TIRAZZO SENZA AUTORIZZAZIONE SCRITTA

C R U M A R		MODEL	T3
DESIGNED BY	Bordone	DESIGNED	
DESIGNED BY	Amis	DATE	13/6/81

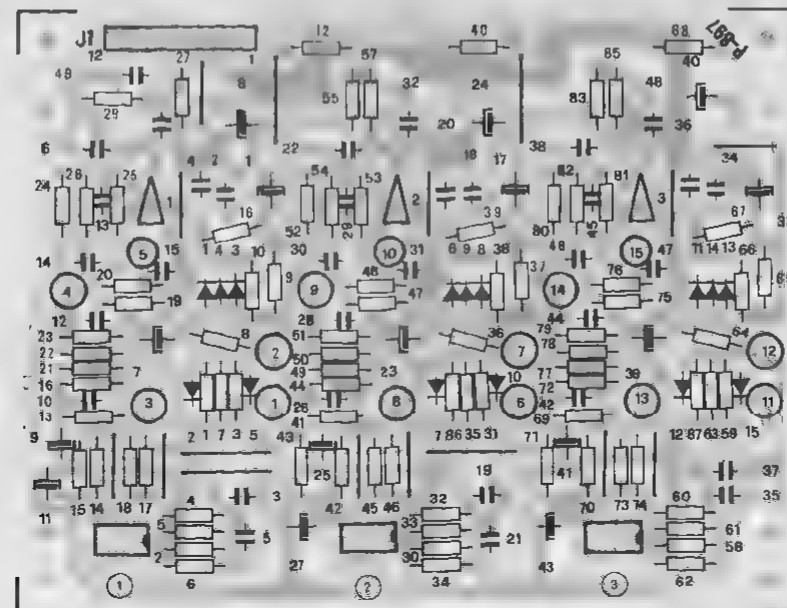
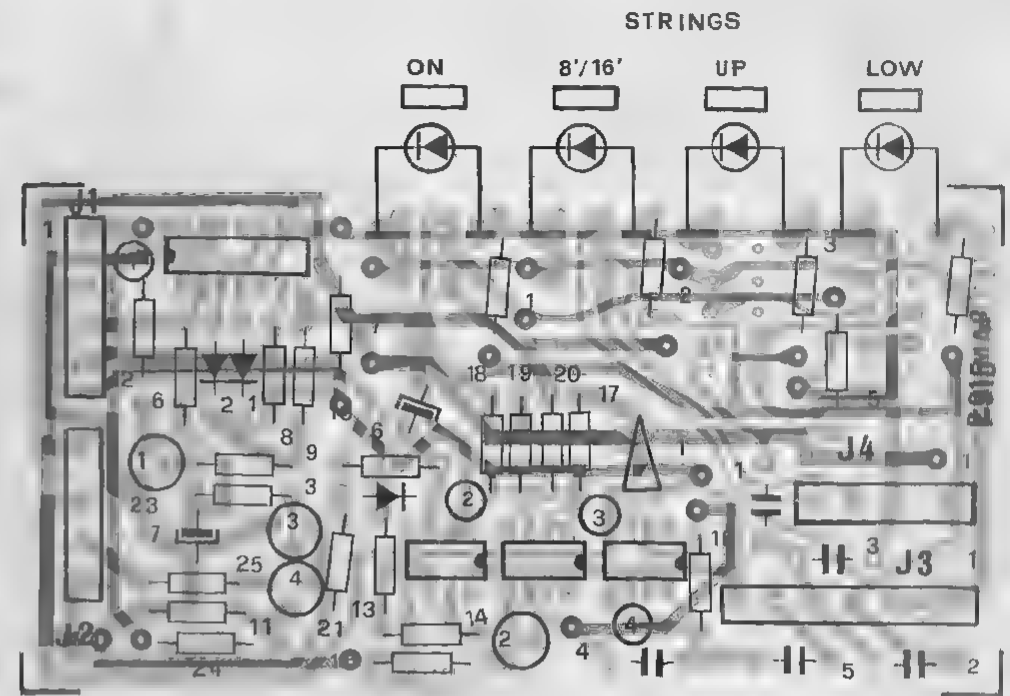
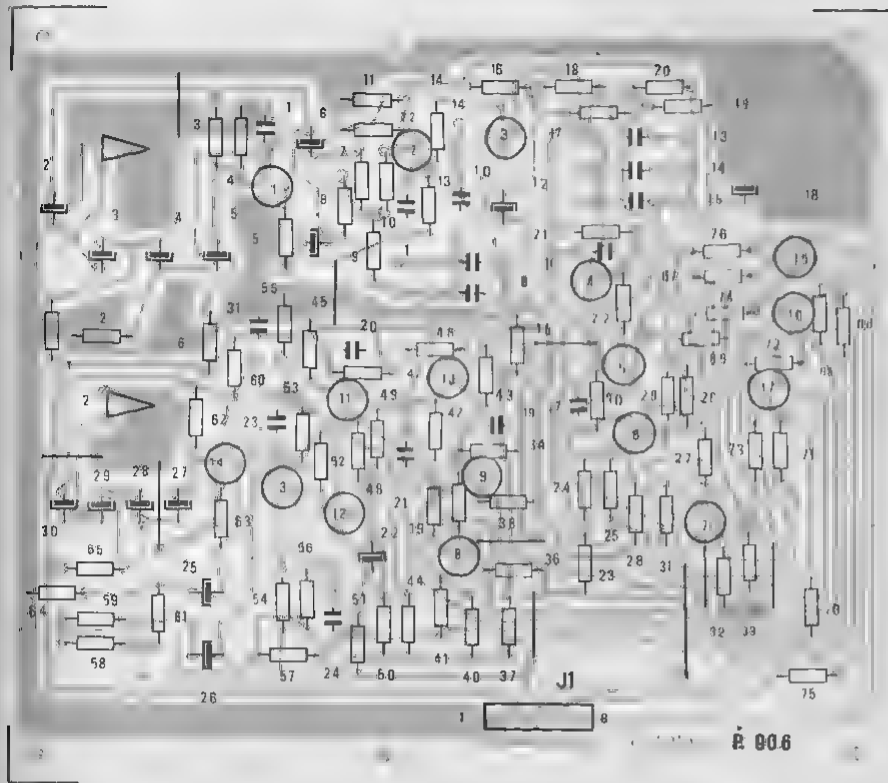




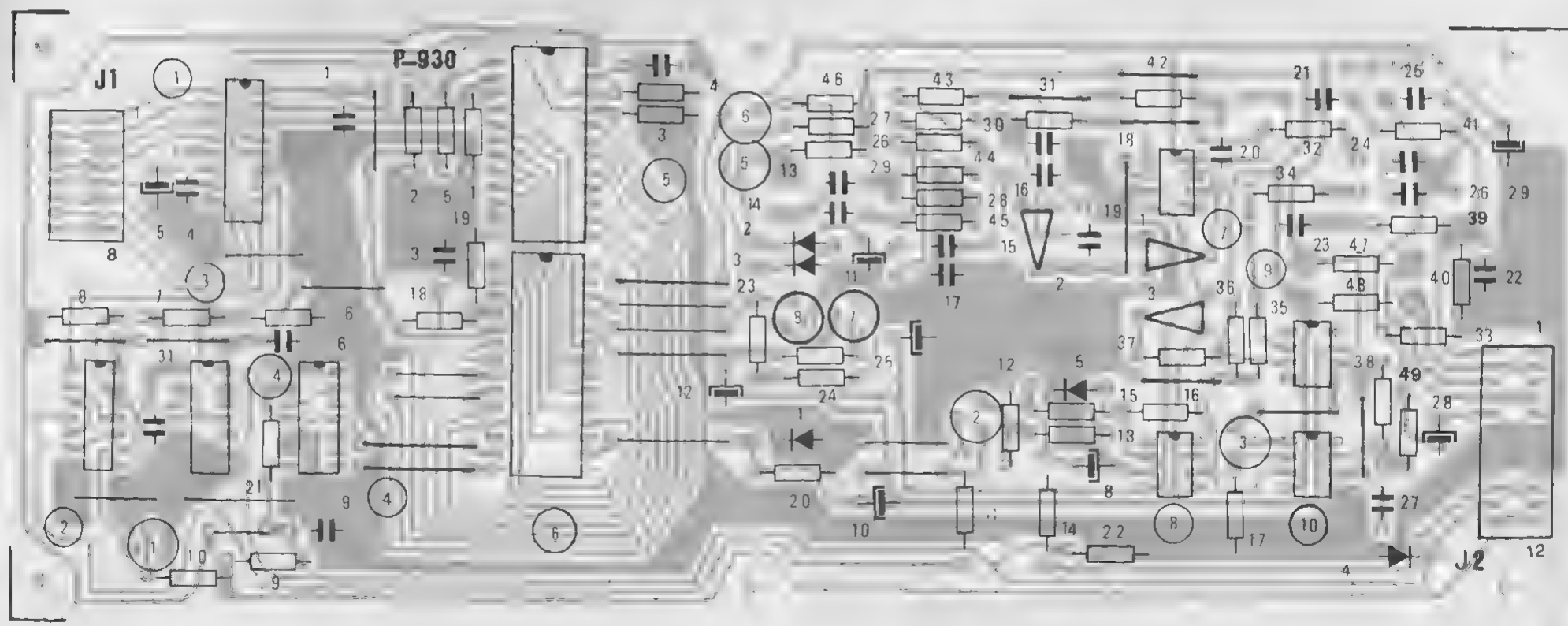


QUESTO SCHEMA È PROPRIETÀ PRIVATA E NON PUÒ ESSERE COPIATO, RIPRODOTTO, MORTATO O TRADOTTO IN ALTRA LINGUA SENZA L'APPROVAZIONE SCRITTA.

GRUMAR		MODEL T3	
DRAWN BY	Budapest	REVISION	
DESIGNED BY	...	DATE	18/6/83



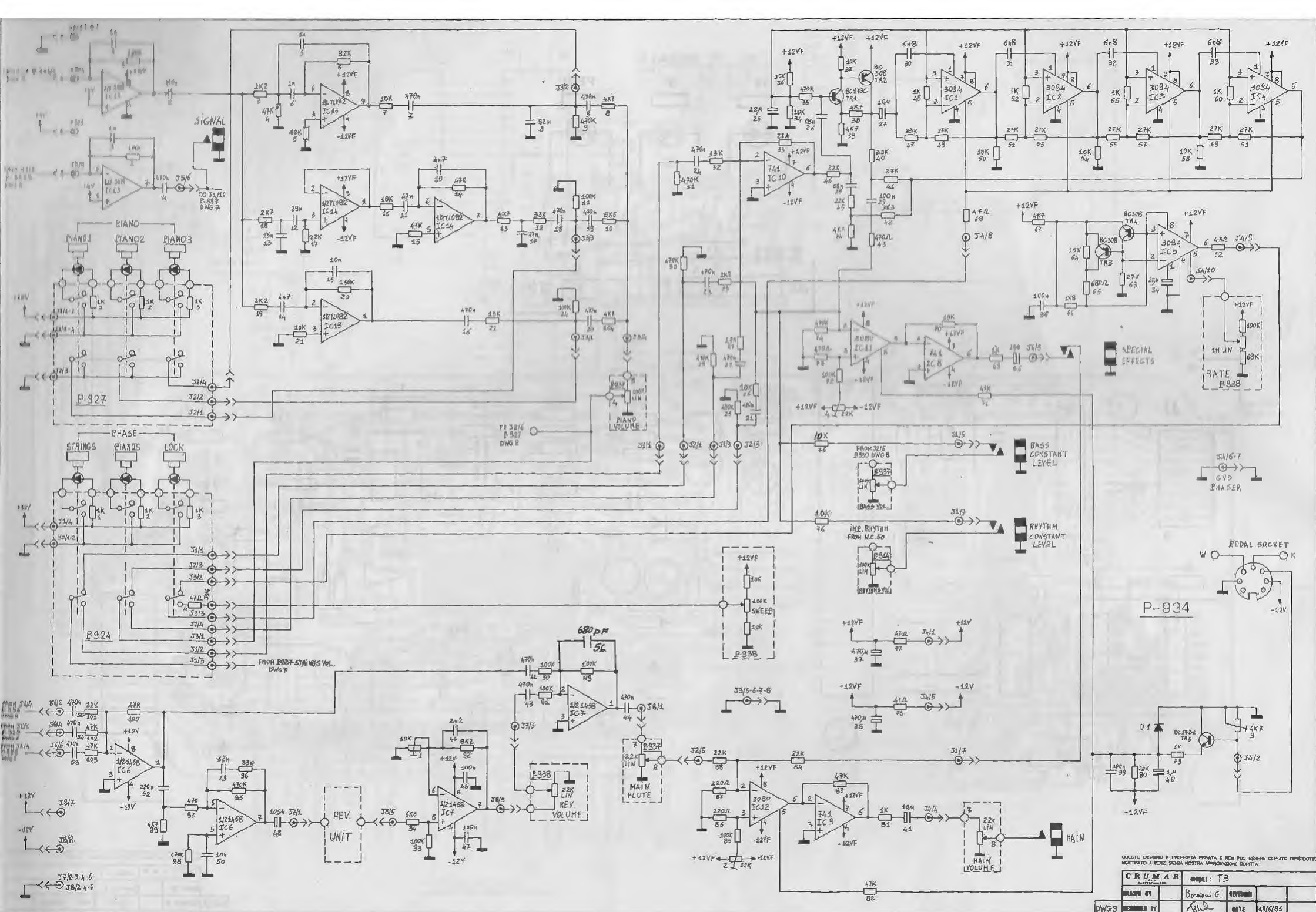
The diagram illustrates a three-phase motor control system. At the top, three main power lines are labeled 16', 8', and PERC. Each line passes through a switch (represented by a circle with a diagonal line) before reaching a phase relay (J1, J2, and J3). The relays are connected to three phase motors (1, 2, and 3). The diagram also shows various electrical symbols for switches, relays, and motors.

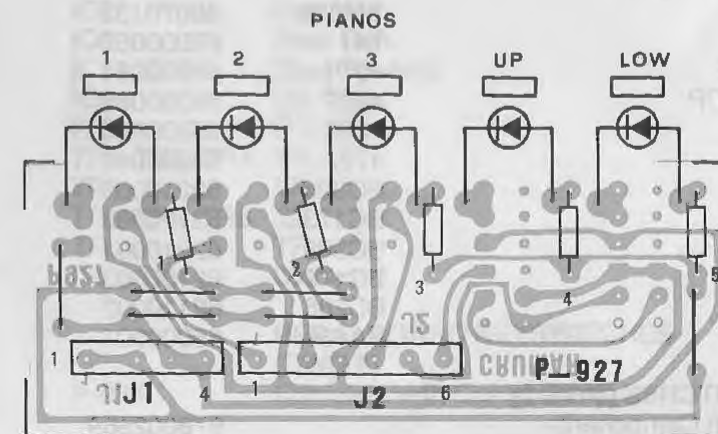
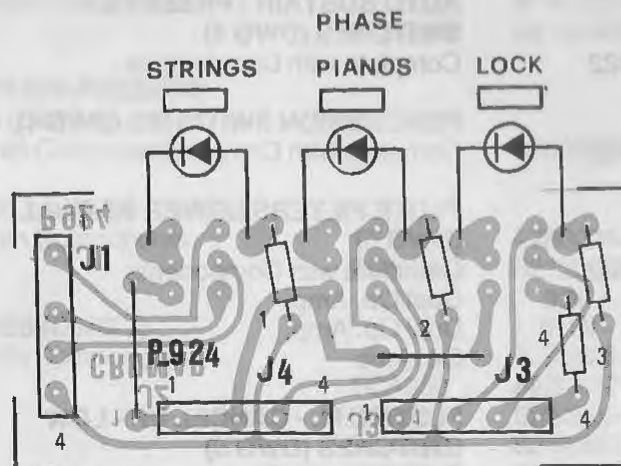
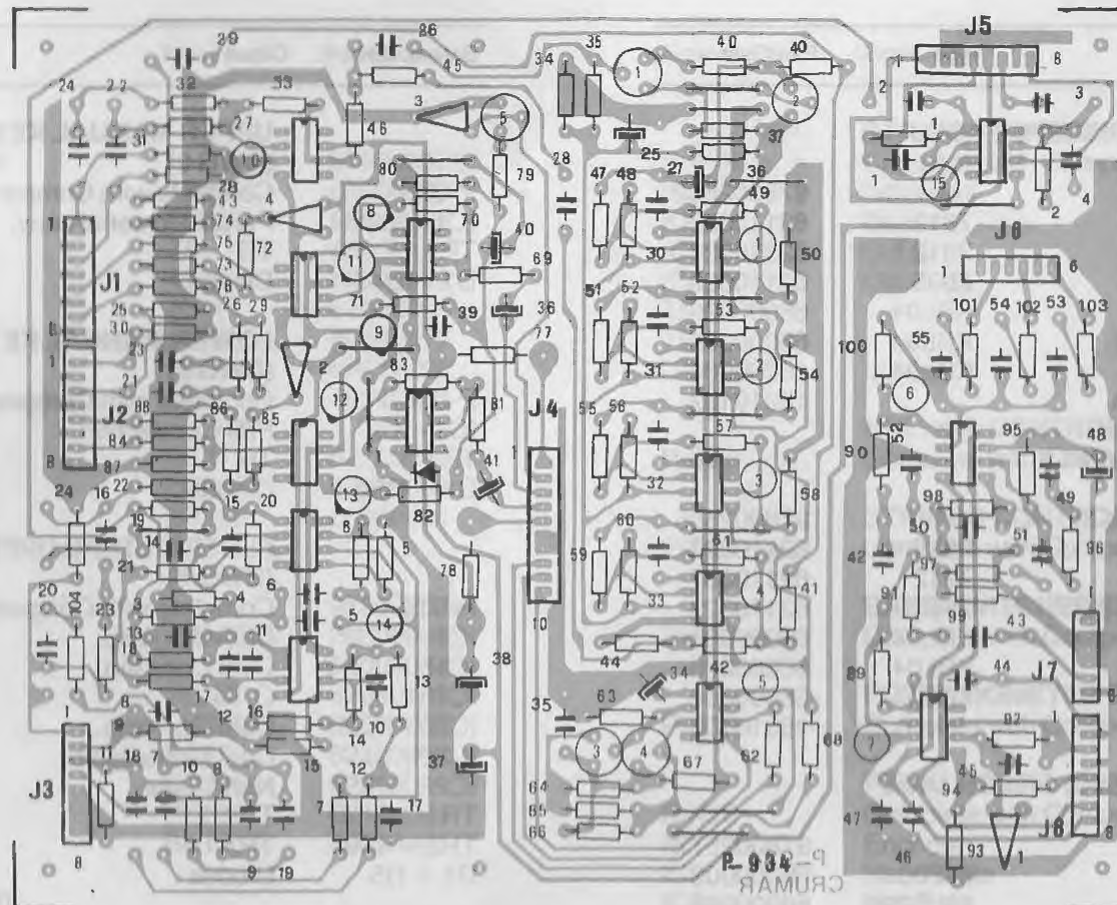


CRUMAR	MODEL 73
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明大鐵釘	80mm 6	明大鐵釘
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DWGEA	DESIGNED BY	<i>[Signature]</i>	DATE
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QUESTO ORDINO È PROPRIETÀ PRIVATA E NON DEVE ESSERE
RIPRODOTTO A TERZI SENZA AUTORIZZAZIONE SCRITTA

CRUMAH		MODEL	1
DRAWN BY	Barton G.	REVISOR	
DESIGNED BY		DATE	10/10/54

DWG-3A

MODEL T3

ELECTRONIC COMPONENT LIST

Schem. Ref.	Circuit	Type	Part Code
SEMKO VERSION - POWER SUPPLY (DWG 1)			
P-920	Complete with Components		978002562
RT1	Voltage Regulator	7812	62110027
RT2	Voltage Regulator	7912	62110037
RT3	Voltage Regulator	7805	62110023
PD1	Rectifier Bridge	KBL04	66000006
PD2	Rectifier Bridge	KBL04	66000006
PD3	Rectifier Bridge	KBL04	66000006
T64	Transformer SEMKO Version		18010102
CSA VERSION - POWER SUPPLY (DWG 1)			
P-920	Complete with Components		978002585
RT1	Voltage Regulator	7812	62110027
RT2	Voltage Regulator	7912	62110037
RT3	Voltage Regulator	7805	62110023
PD1	Rectifier Bridge	KBL04	66000006
PD2	Rectifier Bridge	KBL04	66000006
PD3	Rectifier Bridge	KBL04	66000006
T64	Transformer CSA Version		18010103
FLUTES - PIANO - STRINGS GENERATION (DWG 2)			
P-935/2	Complete with Components		978002577
IC1 - IC15	T.O.S.	50240	68000009
IC2	Master Oscillator	74LS221	68000058
IC3 - IC4	Strings - Piano - Gen.	SM302	68070165
IC5 ÷ IC7	Flutes Gen.	SM305	68070135
IC8	Op. Amp.	741	68000059
IC9 - IC10	NAND GATE	4011	68000034
IC12	J-K FLIP-FLOP	4027	68000089
IC13	Trigger	4093	68000050
IC14	Divider	4727	68000041
TR1 - TR17	TR.	BC308	62210001
TR2 ÷ TR5	TR.	BC173C	62120003
TR6 ÷ TR11	TR.	BC308	62210001
TR12 ÷ TR15	TR.	BC173C	62120003
TR16	TR.	BC286	62110002
D1 ÷ D6	Diodes	BA130	65000001
P-927	PIANOS SWITCHES (DWG 2) Complete with Components		978002569
P-938	POTENTIOMETER BOARD (DWG 2) Complete with Components		978002581

MODEL T3

ELECTRONIC COMPONENT LIST

Schem. Ref.	Circuit	Type	Part Code
UPPER MANUAL KEYSWITCHES (DWG 3)			
P-903	Complete with Components		978002545
IC1 - IC2	Parallel to serial conv.	SM304A	68070134
TR1	TR	BC173C	62120003
D1 ÷ D49	Diodes	BA130	65000001
LOWER MANUAL KEYSWITCHES (DWG 3)			
P-904/2	Complete with Components		978002546
IC1 - IC2	P/S Conversion	SM304A	68070134
TR1	TR	BC173C	62120003
D1 ÷ D85	Diodes	BA130	65000001
FLUTE FILTERS UPPER MANUAL (DWG 4)			
P-919	Complete with Components		978002561
IC1 ÷ IC14	Dual Op. Amp.	LM358	68030174
IC15 ÷ IC18	Dual Op. Amp.	1458	68000053
IC19	O.T.A.	3080	68000066
IC20 - IC21	Dual Op. Amp.	1458	68000053
IC22	Dual Monostable	74C221	68000099
IC23	Nand Gate	4011	68000034
TR1	TR.	BC308	62210001
TR2 ÷ TR4	TR.	BC173C	62120003
D1 ÷ D5	Diodes	BA130	65000001
AUTO SUSTAIN - PRESETS SWITCHES (DWG 4)			
P-922	Complete with Components		978002564
PERCUSSION SWITCHES (DWG 4)			
P-926	Complete with Components		978002568
FLUTE FILTERS LOWER MANUAL (DWG 5)			
P-932	Complete with Components		978002574
IC1 ÷ IC8	Dual Op. Amp.	LM358	68030174
IC9 - IC10	Dual Op. Amp.	1458	68000053
IC11	Op. Amp.	741	68030141
FLUTE L.M. - CANCEL UP - LOW SWITCHES (DWG 5)			
P-921	Complete with Components		978002563
VOLUME CONTROLS (DWG 5)			
P-937	Complete with Components		978002580

MODEL T3

ELECTRONIC COMPONENT LIST

Schem. Ref.	Circuit	Type	Part Code
AUTO-SUSTAIN (DWG 6)			
P-933	Complete with Components		978002575
IC1	Dual Op. Amp.	1458	68000053
IC2	O.T.A.	3080	68000066
IC3	Op. Amp.	741	68030141
IC4 - IC10	Binary Counter	4024	68010122
IC5 - IC9	Nand Gate	4011	68000034
IC6	Exclusive Or	4070	68000070
IC7	D Flip-Flop	4013	68010136
IC8	Static Shift Register	4031	68010164
TR1-TR2- TR4-TR5		BC173C	62120003
TR3		BC308	62210001
D1 ÷ D23	Diodes	BA130	65000001
R.S.S. (DWG 6)			
P-936	Complete with Components		978002578
IC1	ADL	TDA1022	68000084
IC2	Nand Gate	4011	68000034
IC3	Dual Op. Amp.	TL082	68030163
IC4	Dual Op. Amp.	LM358	68000093
TR1 ÷ TR3	TR	BC239	62120003
TR4	TR	BC308	62210001
TR5	TR	BC239	62120003
D1 ÷ D8	Diodes	BA130	65000001
R.S.S. SWITCHES (DWG 6)			
P-925	Complete with Components		978002567
TR1	TR.	BC173C	62120003
AUTO-SUSTAIN-PRESETS SWITCHES (DWG 6)			
P-922	Complete with Components		978002564
A.D.L. OSCILLATORS (DWG 7)			
P-906	Complete with Components		978002548
TR1 ÷ TR17	TR.	BC173C	62120003
DELAY LINES (DWG 7)			
P-997	Complete with Components		978002586
IC1 ÷ IC3	A.D.L.	TCA350	68000007
TR1 ÷ TR3	TR.	BC308	62210001
TR4 - TR5	TR.	BC173C	62120003
TR6 ÷ TR8	TR.	BC308	62210001
TR9 - TR10	TR.	BC173C	62120003
TR11 ÷ TR13	TR.	BC308	62210001
TR14 - TR15	TR.	BC173C	62120003
D1 ÷ D15	Diodes	BA130	65000001

MODEL T3

ELECTRONIC COMPONENT LIST

Schem. Ref.	Circuit	Type	Part Code
STRINGS SWITCHES (DWG 7)			
P-915	Complete with Components		978002557
IC1	Nor Gate	4001	68000020
IC2	Dual Op. Amp.	1458	68000053
IC3	O.T.A.	3080	68000066
IC4	Op. Amp.	741	68000059
TR1		BC173C	62120003
TR2		BC308	62210001
D1 ÷ D3	Diodes	BA130	65000001
VOLUME CONTROLS (DWG 7)			
P-937	Complete with Components		978002580
STRINGS CONTROLS (DWG 7)			
P-929	Complete with Components		978002571
BASS SWITCHES (DWG 8)			
P-923	Complete with Components		978002565
POTENTIOMETER BOARD (DWG 8)			
P-938	Complete with Components		978002581
PEDALBOARD (DWG 8)			
P-930	Complete with Components		978002572
IC1	Encoder	74C922	68000110
IC2	Nand Gate	4011	68000034
IC3	Nor Gate	4001	68000020
IC4	Divider	4727	68000041
IC5	Decoder	CD4515	68010162
IC6	Bass Gen.	3615	68000106
IC7 - IC10	Dual Op. Amp.	1458	68000053
IC8	Op. Amp.	741	68000059
IC9	O.T.A.	3080	68000066
TR1-TR2-TR4	TR.	BC173C	62120003
TR3	TR.	BC308	62210001
TR5-TR6-TR8	TR.	BC308	62210001
TR7	TR.	BC173C	62120003
D1 ÷ D5	Diodes	BA130	65000001
PEDALBOARD KEYSWITCHES (DWG 8)			
P-931	Complete with Components		978002573
FINAL PREAMPLIFIERS (DWG 9)			
P-934	Complete with Components		978002576
IC1 ÷ IC5	O.T.A.	3094	68000098
IC6 - IC7	Dual Op. Amp.	1458	68000053
IC8 ÷ IC10	Op. Amp.	741	68030141